

PATENT SPECIFICATION

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(54) AN ADJUSTABLE CHAIR

(71) I, DESMOND GOGARTY an Irish Citizen of Lamlesh Mornington Drogheda, County Louth, Ireland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to a construction of adjustable chair.

Dentists, doctors, hairdressers and other professions often require the use of a chair which is adjustable so that its occupant can be in any position from lying prone to sitting upright.

When such chairs are required by dentists, it is common to provide them with motor control and locking means to enable them to be tilted and secured in any desired position. Such a construction of chair is expensive to manufacture, bulky and cumbersome in use, and expensive to maintain.

The different positions to which such a chair may be moved normally involves changing the angle between the seat and the backrest. The invention derives from the observation that changing the said angle causes sensations of discomfort and, occasionally, alarm to the chair occupant if the axis upon which the chair members pivot is substantially remote from the pivotal axis of the chair occupant's hip joints.

The present invention provides an adjustable chair steplessly movable between a substantially upright and a substantially prone position through intermediate reclining positions, and lockable at choice in any of the said positions, comprising a stand, a backrest and a seat pivotally mounted to the stand about a first pivotal axis which is parallel to the seat and the backrest, the and the seat being pivotally connected together for pivotal movement with respect to one another about a second pivotal axis

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parallel to the first pivotal axis, the second pivotal axis being so located that it passes substantially through the hip-joint axis of a normal chair occupant when occupying the chair.

In the average adult human body the hip joint axis lies about two inches inferior to the bodily centre of gravity. As it is desirable for the first pivotal axis to pass substantially through the centre of gravity of the chair occupant this is accordingly, the preferred distance between the first and second pivotal axes.

If a leg support is provided, leg support articulation means may also be provided and may share one or more members with the seat articulation means aforesaid. Thus, in a preferred embodiment, the seat articulation means includes a guiding lever which can turn about a fixed point mounted on the stand, and which is coupled to the backrest and to the seat by means of separate link members. This guiding lever may be additionally coupled to the leg support by means of a further link member.

The lengths of these link members and their points of attachment to the guiding lever, to the backrest, to the seat and to the leg support (if present) are, of course, chosen to provide in each case not only the necessary connection but also the desired mechanical advantage and thus to predetermine the relative rates of pivot of the backrest, the seat and the leg support. In this way the permitted range of positions for the adjustable chair is also determined, from an upright or conventional chair position to a prone position where the backrest, the seat and the leg support may be substantially in a single plane. The link members preferably comprise rigid connecting rods pivotally attached at both ends.

The adjustable chair of the invention is, as stated above, lockable at choice in any of its positions, and a locking means for

this purpose may take any of a wide variety of forms. The common feature of all such forms is that it immobilises at least one pivotally movable member of the adjustable chair with respect to any other having a different ambit of movement, or with respect to the stand. For example, a clutch may be provided which when actuated increases the friction in any pivotal joint of the chair to an immobilising value. Alternatively a piston and cylinder may be provided having stop means to render the piston immobile in the cylinder, the piston being connected to one pivoting member of the chair and the cylinder to another. This arrangement has the additional advantage that the piston and cylinder may be constructed as a hydraulic unit, in which an incompressible fluid is forced through a narrow orifice by the movement of the piston, thereby providing a damping action on the chair in its pivotal motion and making adjustment smooth and controllable for the operator and comfortable for the occupant.

For mechanical convenience the greater part of the mechanism described may be duplicated, one set of members being located on each side of the chair so that a given pivot may be embodied as two pivot members, one on each side of the chair, but having a common axis in space, and references to a pivot in the singular in the above description are to be understood as including the plural in that sense. The drawings illustrate a mechanism located at one side of an adjustable chair according to the invention. A similar mechanism constructed as a mirror-image of the one shown, reflected in the median vertical plane of the chair, is to be understood as located at the other side of the chair, the two mechanisms cooperating in the adjustable movement of the chair. All significant pivots are to be understood as co-axial pairs, one member of each pair belonging to each of the mechanisms. The remarks apply to every member shown in the drawings except

- (a) the stand 1 and any extensions thereof,
- and
- (b) the locking means 23, 26, 27, 62.

The invention will be more clearly understood from the following description of embodiments thereof given by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a side elevation of the mechanism of an adjustable chair according to the invention shown in a reclining position,

Fig. 2 is a side elevation of the mechanism of the chair of Fig. 1 in a slightly more upright position,

Fig. 3 is a side elevation of the mechanism of the chair of Fig. 1 in a still more upright position,

Fig. 4 is a side view of portion of the stand of the chair of Fig. 1,

Fig. 5 is a side view of the guiding lever of the chair of Fig. 1 and

Fig. 6 is a side elevation of the mechanism of an adjustable chair according to a second embodiment of the invention.

Referring to Figs. 1-5 of the drawings the chair framework comprises a ground engaging base 1 on which is fitted an upper base frame 2 which supports a seat framework 3 a backrest framework 4 and a leg support framework 5. The seat framework 3, the backrest framework 4 and the leg support framework 5 support the conventional cushioning and springing means which are not shown.

The upper base frame 2 has an upright 2a which supports an inclined bar member 6. The upper base frame 2 is also provided with an extension arm 7. The backrest framework 4 is pivotally jointed by means of a pin 8 and a rigid connecting bar 9 to the inclined bar member 6. A four legged guiding lever 10 is pivotally mounted by a pin 11 through one of its legs on the inclined bar member 6; a second leg of the four legged guiding lever 10 is connected by pins 12 and 13 and a link 14 to the backrest framework 4. The backrest framework 4 and the seat framework 3 are pivotally connected together by a pin 15 and rigid connecting bars 4a and 3a. The seat framework 3 is connected to a third leg of the four legged guiding lever 10 by means of a link 16 and pins 17 and 18. The leg support framework 5 is pivotally jointed to the seat framework 3 by a pin 19 and is connected by means of a link 20 and pins 21 and 22 to the fourth leg of the four legged guiding lever 10.

A single bar 23 is pivotally mounted on both the extension arms 7 by pins 24 and slidably engages a hole 25 in a support plate 26. The support plate 26 is split to form a slit 29 which extends to the hole 25. A threaded bar 27 having a handle 27a engages the support plate 26 adjacent the slit 29. Rotation of the handle 27a causes the faces (not shown) of the slit 29 to move relative to each other thus tightening or loosening the fit of the steel bar 23 in the hole 25. This assembly is the locking means. It may be replaced by a ratchet with two pawls.

In operation, when a person sits in the chair, the centre of gravity of the person lies approximately on the imaginary line between the pins 8 and the hip joint axis of the person substantially coincides with the axes of the pins 15. With the handle 27a rotated so as to allow the bar 23 slide freely in the hole 25, the occupant of the chair may be tipped into any position. In operation, the

movement of the members 4a and 3a about the pin 15 simulates the action of the hip joint of the person. When it is desired to lock the chair in any one position the handle 27a is rotated to tighten the fit of the bar 23 in the hole 25. It is only necessary to tighten the handle 27a to retain the bar 23 in the hole 25 when for example a dentist needs a rigid chair for attending to a patient.

The embodiment of Fig. 6 is intended to illustrate how widely some of the details of the invention can vary. Most of the members are numbered as in Figs. 1-5, but it will be noted that the guiding lever 10 is no longer four-legged but C-shaped. The body-contacting surface 60 of the backrest 4 is shown, and it will be seen that this surface 60 is offset (X) 4" along the perpendicular between itself and pivot 8, this being taken as the average depth of a human bodily centre of gravity from the dorsal surface of the body. Likewise the seat surface 61 is shown, and is located 4" offset from pivot 15, (Y) this being the average height of the hip-joint axis above the lower surface of the thighs in an upright sitting position. A lockable hydraulic piston and cylinder indicated only by the dotted line 62 is provided, pivotally mounted on pins 63 and 64, the location of which gives scope for wide choice. When locked against reciprocating movement, the piston and cylinder unit 62 locks the entire chair against further adjustment.

People do vary somewhat, although not greatly, in the location of their hip joints axis. It would be possible to allow for this by providing for adjustment of length of e.g. the members 3a and 9 in Fig. 6.

WHAT I CLAIM IS:—

1. An adjustable chair steplessly movable between a substantially upright and a substantially prone position through intermediate reclining positions, and lockable at choice in any of the said positions, comprising a stand, backrest and a seat pivotally mounted to the stand about a first pivotal axis which is parallel to the seat and the

backrest, the backrest and the seat being pivotally connected together for pivotal movement with respect to one another about a second pivotal axis parallel to the first pivotal axis, the second pivotal axis being so located that it passes substantially through the hip-joint axis of a normal chair occupant when occupying the chair.

2. An adjustable chair as claimed in claim 1, wherein articulation means are provided to ensure that when the chair is pivoted about the said first axis the backrest and the seat also pivot about the said second axis to alter the angle included therebetween.

3. An adjustable chair as claimed in claim 2 wherein the seat articulation means includes a guiding lever which can turn about a fixed point mounted on the stand, said lever being coupled to the backrest and to the seat by means of separate link members.

4. An adjustable chair as claimed in claim 3 wherein a leg support depends from and is pivotally mounted on the front end of the seat.

5. An adjustable chair as claimed in claim 4 wherein leg support articulation means are provided to ensure that when the chair is pivoted about the said first axis, the leg support also pivots about the front end of the seat to alter the angle included therewith.

6. An adjustable chair as claimed in claim 5 wherein the leg support articulation means includes a link member coupled at one of its ends to the guiding lever and at the other of its ends to the leg support.

7. An adjustable chair substantially as herein described with reference to figures 1 to 5 or Figure 6 of the accompanying drawings.

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3 SHEETS

COMPLETE SPECIFICATION

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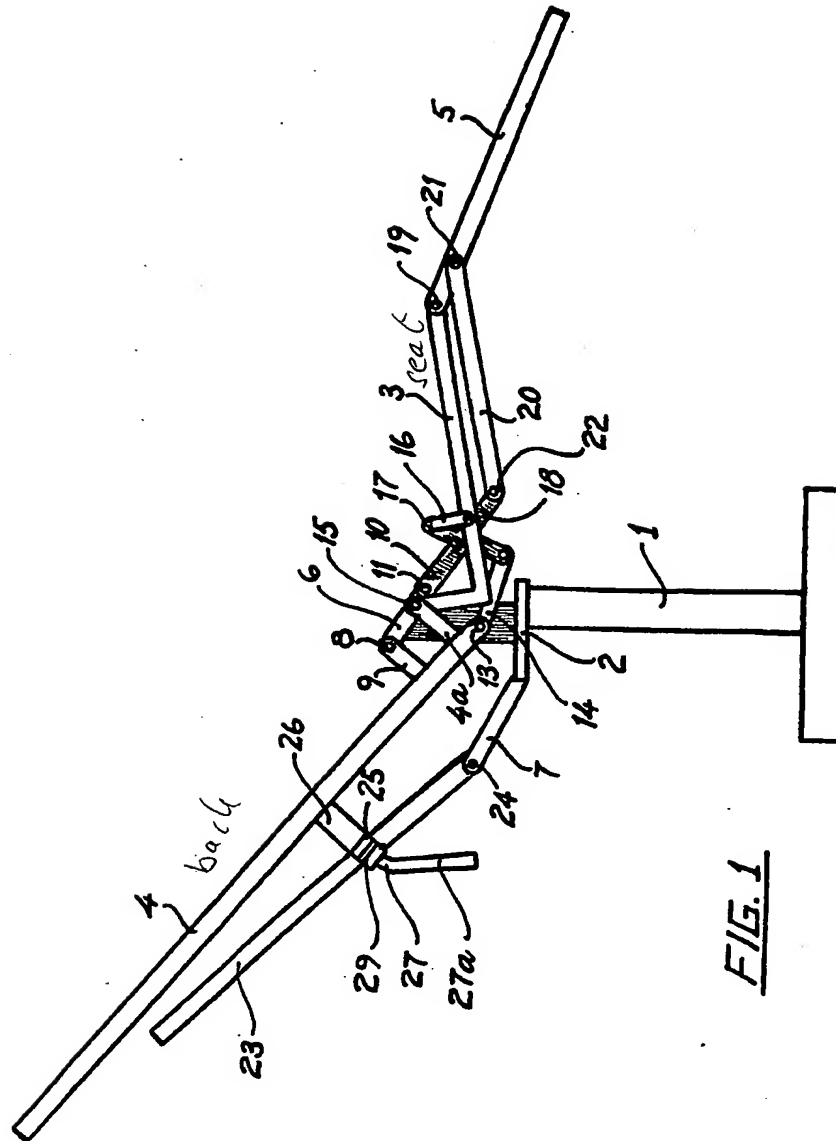
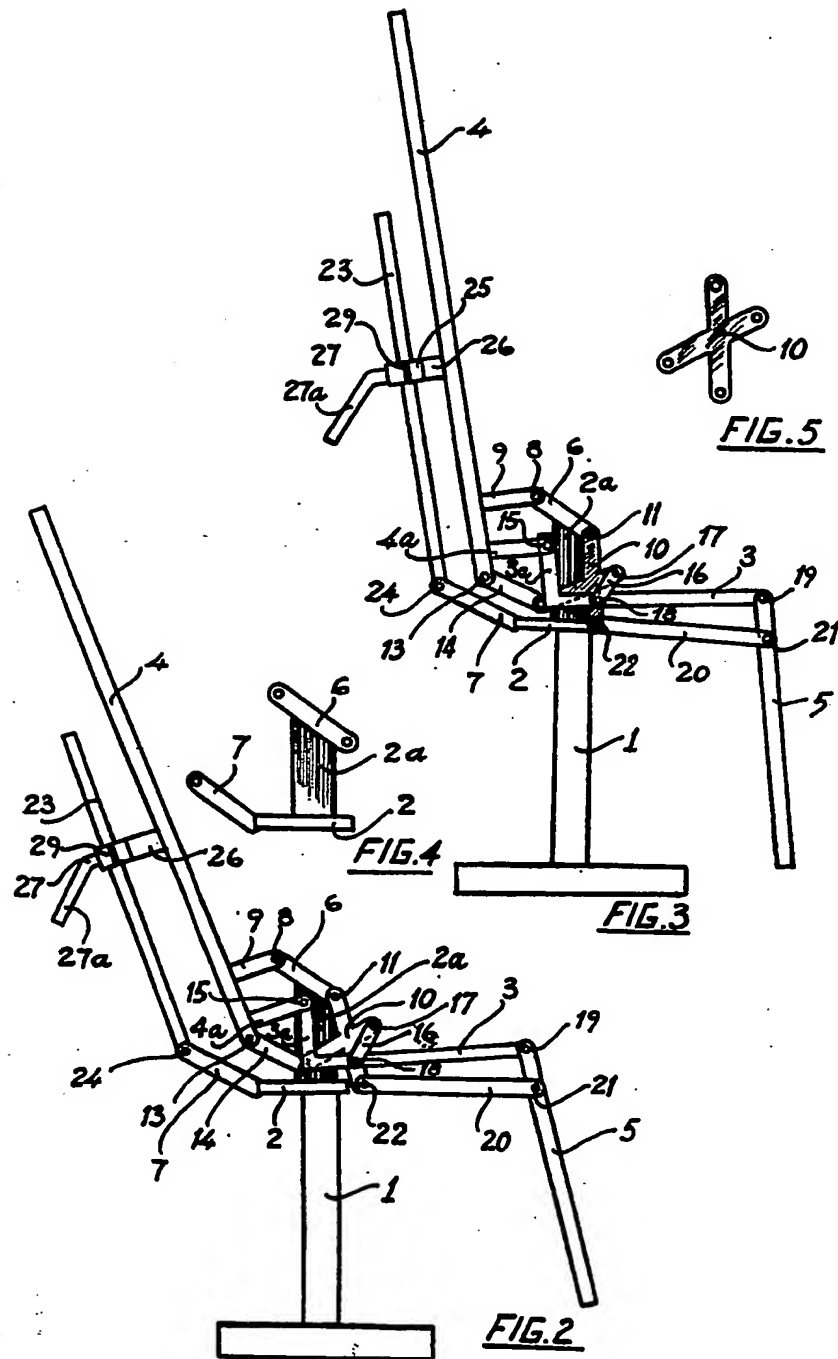


FIG. 1



1 414 175 **COMPLETE SPECIFICATION**
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3 SHEETS

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SHEET. 3

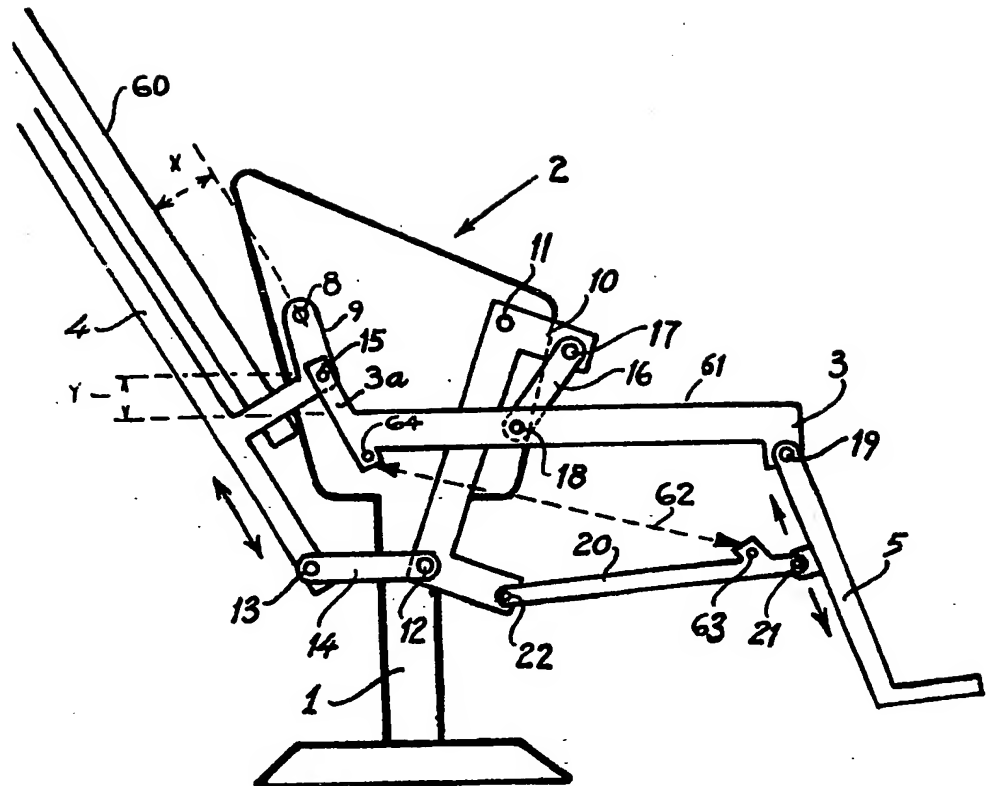


FIG. 6

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